SECTION 300 -- BASES

SECTION 301 -- Blank

SECTION 302 -- Blank

SECTION 303 -- COMPACTED AGGREGATE BASE, SURFACE, OR SHOULDERS

303.01 Description. This work shall consist of a base course, surface course, shoulders, or a combination of these, of dense-graded aggregate of one of the types herein set out constructed on a prepared subgrade, subbase, or on an existing surface to be used as a base, all in accordance with these specifications and in reasonably close conformance with the lines, grades, quantities, or thickness shown on the plans, or as directed.

(a) Type O Mix. The aggregate shall contain sufficient moisture to avoid segregation during loading, hauling, placing, and shaping operations.

(b) Type P Mix. The aggregate shall contain sufficient moisture to facilitate compaction. When calcium chloride is required as set out in 303.04, plant mix material shall have sufficient water added to the aggregate to produce a mixture having a moisture content approximately equal to optimum moisture content, which is anticipated to range from 7 to 9 percent of the dry aggregate by weight. The amount of water shall be as directed.

MATERIALS

303.02 Materials. Materials shall be in accordance with the following:

Calcium Chloride 913.02
Coarse Aggregates, Class A, B, C, or D
For Compacted Aggregate Base, Surface, and Shoulders No. 53 .....904.02
For Compacted Aggregate Surface and Shoulders No. 73 .....904.02
For Compacted Aggregate Surface and Shoulders No. 73 .....904.02
Water 913.01

CONSTRUCTION REQUIREMENTS

303.03 Preparation of Type P Mixture.

(a) Mixer Unit. The mixer unit shall be a single or twinshaft pugmill, or another approved mixer, capable of producing a constant uniform mixture. The discharge height of the mixer unit shall be such that it prevents segregation of the material when discharged into the hauling trucks.

(b) Conveyors and Feeders. The feed conveyor and all auxiliary feeders or attachments shall be fed from receiving hoppers equipped with adjustable metering gates or other devices capable of regulating a constant flow of materials into the mixing unit.

(c) Water Pump and Meter. A spray bar capable of assuring an even wetting of the aggregate shall be mounted at the entrance of or above the pugmill. A suitable pump, water meter, or other registering device capable of regulating the flow through the spray bar at the pre-set rate shall be used to introduce water into the mix.

(d) Mixing. Calcium chloride, when used, shall be incorporated in accordance with 303.04. Water shall be added at the plant in accordance with 303.01(b). Material shall not progress through the mixer faster than a rate which will produce a thoroughly mixed product.

303.04 Calcium Chloride. Calcium chloride will be required in type P compacted aggregate surface and shoulder mixtures but not in base mixtures unless otherwise specified. When calcium chloride is specified or required, calcium chloride shall be in accordance with 912.03. Calcium chloride, in either dry or liquid form, shall be incorporated into type P mixture at the plant. The amount of pure calcium chloride used shall be 2.7 to 3.9 kg per Mg (5.4 to 7.7 lb per ton) of finished type P mixture as directed. If specified with type O mixture, calcium chloride shall be spread uniformly on the surface of each lift at an approximate rate of 0.22 kg/m5 (0.4 lb per sq yd) of surface per 25 mm (in.) of compacted depth. The amount of commercially available calcium chloride needed shall be the amount of pure calcium chloride needed divided by the purity of the commercial material.

303.05 Preparation of Subgrade or Subbase. The upper 150 mm (6 in.) of all subgrade and subbase shall be compacted to a minimum of 100 percent of maximum dry density as determined in accordance with AASHTO T 99, as modified in 203.24. In areas of 150 m (500 ft) or less in length, or for temporary runarounds, proofrolling will not be required. Also proofrolling will not be required in trench sections where the regular proofrolling equipment cannot be used.

Where compacted aggregate base, surface, or shoulder is placed on a previously constructed course, such previously constructed course shall meet all the requirements for such course as set out in the specifications, or as otherwise specified.

For type O, the preparation of the subgrade shall be the same as required for type P compacted aggregate base, surface, or shoulder, except proofrolling will not be required.

For type P where the compacted aggregate base, surface, or shoulder is to be placed on a subgrade, the subgrade shall be prepared in accordance with 207 and, in addition, shall be proofrolled in accordance with 304.05.

303.06 Handling and Transporting Mixtures. Mixed materials shall be handled and transported so as to prevent segregation and loss of moisture. On long hauls, or in windy or hot weather, when appreciable quantities of moisture might be lost by evaporation, loads in transit may be required to be covered with tarpaulins or other suitable covers as directed.

303.07 Spreading Mixtures. The compacted depth of all type O courses shall be no less than 50 mm (2 in.) nor more than 100 mm (4 in.). Segregation will not be permitted and, if necessary, sufficient moisture shall be added prior to spreading to ensure uniformity. The compacted depth of all type P courses shall be no less than 50 mm (2 in.) nor more than 150 mm (6 in.). For all types, the mixture shall be spread in uniform layers to a depth that will produce the compacted thickness specified. This work shall be done with an approved spreading and leveling device which will spread and shape the material to the required lines, grades, thickness, and section. If directed, each layer shall be shaped by a long base, blade type, road machine and immediately compacted. Each layer shall meet the density requirements at the time the next layer is placed thereon. In areas inaccessible to mechanical equipment, approved handspreading methods shall be used. Any traffic on the aggregate base shall be uniformly dispersed transversely over the surface.

303.08 Control of Width. When required, positive lateral support shall be provided to restrain the materials from being displaced beyond the specified limits. Payment will not be made for material placed outside of a one to one slope from the specified surface edge.

303.09 Compacting Aggregate. Each lift shall be compacted with approved rollers to no less than 100 percent for type P and type O materials of the maximum dry densities as determined by Method C of AASHTO T 99, as modified in 203.24. In places inaccessible to rolling equipment, the required compaction may be obtained with mechanical tampers, vibrators, trench rollers, or other compaction equipment. In all areas which fail to meet the required density, whatever means necessary to rework the aggregate until the required density is obtained shall be used.

In areas such as private drives, mailbox approaches, and temporary runarounds, the density test may be waived. The material in these locations shall be compacted with the same combination of rollers and compaction coverages as used on the mainline lifts. For projects which consist solely of such locations, the material shall be compacted with either a pneumatic tire, tandem, or three wheel roller in accordance with 408.03(d).

Construction traffic using the compacted aggregate layers shall be kept well dispersed so as to assist in obtaining uniform compaction and to avoid displacement of the material and the formation of ruts.

303.10 Checking and Correcting Surface. The finished surface shall be checked transversely with a template prepared to the cross section shown on the plans. The roadway surface shall be checked for smoothness with a 4.9 m (16 ft) straightedge in accordance with 402.16. Any deviations in excess of 13 mm (1/2 in.) shall be scarified, remixed, and compacted to the required grade and cross section. This same correction shall also apply if the surface, before acceptance, becomes uneven or distorted and sets up in this condition.

303.11 Temperature Limitations. No mixture shall be placed when the air temperature at the site of the work is at or below 2EC (35EF).

303.12 Priming Compacted Aggregate Base. A prime coat, if required, shall be in accordance with 405.

303.13 Blank.

303.14 Protection of Surface. The finished compacted aggregate base, surface, or shoulder shall be maintained true to line, grade, and required density until the bituminous prime, if required, is placed thereon as directed or until accepted.

303.15 Method of Measurement. Compacted aggregate base, surface, or shoulder will be measured by the megagram (ton) in accordance with 109.01(b). Calcium chloride will be measured by the megagram (ton).

303.16 Basis of Payment. The accepted quantities of type O and type P compacted aggregate will be paid for at the contract unit price per megagram (ton), complete in place. When steel slag is used as compacted aggregate in shoulders, and payment will be made per megagram (ton), the pay quantity will be adjusted in accordance with 904.02(a).

Calcium chloride in either dry or liquid form will be paid for at the contract unit price per megagram (ton) for pure calcium chloride. The pay quantity will be determined as follows:

(a) Megagrams (Tons) of calcium chloride type 1 times 0.77 equals megagrams (tons) of pure calcium chloride.

(b) Megagrams (Tons) of calcium chloride type 2 times 0.94 equals megagrams (tons) of pure calcium chloride.

If natural brine is used, the amount of pure calcium chloride contained in the brine solution will be determined by means of laboratory tests.

Payment will be made under:

Pay Item	**Metric Pay Unit Symbol (English Pay Unit Symbol)**
Calcium Chloride, for _____	Mg (TON)
Compacted Aggregate, O, _____ size	Mg (TON)
Compacted Aggregate, P, _____ size	Mg (TON)

The costs of compacting, placing, processing, excavating, backfilling, water, and necessary incidentals shall be included in the costs of the pay items.

If there is no pay item for type O compacted aggregate, a change order may be executed to permit the substitution of type O for type P aggregate. Payment for type O compacted aggregate will be made at a unit price that is equal to 90 percent of the contract unit price for type P compacted aggregate.

SECTION 304 -- SUBBASE

304.01 Description. This work shall consist of a foundation course of selected material, placed and compacted as a subbase on a prepared subgrade, in accordance with these specifications, and in reasonably close conformance with the lines, grades, thickness, and typical cross sections shown on the plans or as directed.

MATERIALS

304.02 Materials. The material used may be crushed stone, crushed or uncrushed gravel, air-cooled blast furnace slag, or granulated blast furnace slag in accordance with 303.

CONSTRUCTION REQUIREMENTS

304.03 Subgrade Preparation. Subgrade on which subbase material is to be placed shall be prepared in accordance with 207.

304.04 Spreading. If the required thickness of the subbase exceeds 175 mm (7 in.), the material shall be placed in 2 or more layers as directed. If spreading devices are used which will ensure proper depth and alignment, forms will not be required. Otherwise, forms shall be used. Forms shall be of wood or steel, adequate in depth, straight, of uniform dimensions, and equipped with positive means for holding their ends rigidly together and in line. Segregation shall be avoided regardless of the method used.

Traffic of any kind will not be permitted on the subbase if it causes displacement of the material or mixing with the subgrade.

304.05 Compacting. Stone, gravel, or air-cooled blast furnace slag subbase material for each lift, after being spread and shaped, shall be compacted to a minimum of 100 percent of maximum dry density as determined in accordance with AASHTO T 99, as modified in 203.24. An approved vibrating device shall be used. It may be supplemented by a three wheel, tandem, or pneumatic tire roller in accordance with 408.03(d). Construction procedures, including sufficient wetting and number of passes of the vibrator, shall be used to ensure that the above density is attained. If the vibrating device produces unsatisfactory results it may be replaced with other compaction equipment, if approved.

For granulated slag subbase material, the moisture content at time of compaction shall be within the range of 10 to 22 percent by dry weight. If the incoming material contains less than 10 percent moisture, water shall be added and mixed with the material until a uniform moisture content within the specified limits is obtained. If the incoming material contains more than 22 percent moisture, it shall be aerated in a loose condition until a uniform moisture content within the specified limits is obtained. Otherwise, construction methods and compacting equipment for granulated slag shall be in accordance with the above requirements for other types of subbase. The minimum required density shall be 98 percent of that obtained on a test section built at the start of work. The compaction of this test section shall be continued for the full depth of the course being placed until there is no further appreciable increase in density as determined by the test results.

During construction of the project, if there is an appreciable change in gradation of the granulated slag, a new test section shall be built in order to establish a new weight for the density requirements.

In areas inaccessible to standard size compacting equipment and at bridge approaches, a single shoe vibrator or other approved compacting equipment shall be used.

If the subsequent courses are HMA, the subbase shall be proofrolled prior to placing the next course. The rolling shall be completed with a pneumatic tire roller in accordance with 408.03(d)3 and shall consist of two complete coverages, or as otherwise directed. All roller marks, irregularities, or failures shall be corrected as directed.

304.06 Surface Requirements. At the time a base or pavement is to be placed on subbase, the subbase shall meet the required density and the surface tolerance for subgrade as required in these specifications for the kind of base or pavement to be placed thereon.

304.07 Method of Measurement. Subbase will be measured by the cubic meter (cubic yard) based on the theoretical volume to the neat lines as shown on the plans. The accepted quantity for payment will be the quantity shown in the Schedule of Pay Items as adjusted for authorized changes. The quantity shown in the Schedule of Pay Items will be corrected if it is shown to be in error by more than 2 percent. The quantity shown in the Schedule of Pay Items may be altered by the Department without the consent of the Contractor, and without an adjusted price regardless of the requirements set out in 104.02 and 109.03.

304.08 Basis of Payment. The accepted quantities of subbase will be paid for at the contract price per cubic meter (cubic yard), complete in place.

Payment will be made under:

Pay Item	Metric Pay Unit Symbol (English Pay Unit Symbol)
Subbase	m3 (CYS)

The costs of preparation of subgrade, compacting, water, aeration, proofrolling, subbase materials placed outside neat lines shown on the plans, and necessary incidentals shall be included in the cost of the pay item.

SECTION 305 -- RECONDITIONING

305.01 Description. This work shall consist of reconditioning an existing road or an existing surface, considered as a base, by repairing, patching, widening, sealing cracks and joints, cleaning and reconditioning the ditches, shaping the shoulders, or a combination of these, in accordance with these specifications and in reasonably close conformance with the lines, grades, thickness, and typical cross section shown on the plans or as directed.

MATERIALS

305.02 Materials. Materials shall be in accordance with the following:

Aggregates	904
Asphalt Emulsion	902.01(b)
Asphalt for Undersealing	612.02
Calcium Chloride	913.02
Portland Cement	901.01(b)

Earthwork, if specified in the contract, shall be in accordance with applicable requirements of 200.

CONSTRUCTION REQUIREMENTS

305.03 Repairing. Repairing shall consist of scarifying the existing roadway within the limits shown on the plans or as directed, leveling and shaping to section, incorporation of aggregate and additives if required; compacting; shaping the shoulders, and cleaning and reconditioning the ditches as shown on the typical section.

If specified, the roadway shall, within designated limits, be scarified to the depth shown. The scarified material shall be uniformly mixed and spread over the roadway or roadbed as directed. The nongranular scarified material shall be pulverized so that it will pass a 50 mm (2 in.) sieve. The granular scarified material, including asphalt courses, shall be pulverized so that no piece is larger than the depth of the scarified section. All objectionable material, including large stones, sod, roots, and clods, shall be removed from the roadway section and disposed of satisfactorily.

Calcium chloride, if required, shall be incorporated uniformly in the course prior to compaction. Water may be required during the mixing operations to provide the desired moisture content needed to facilitate compaction. If asphalt additive is specified, the type and amount shall be as directed and in accordance with the applicable requirements of 405. Where specified, an aggregate course shall be constructed in accordance with 303.

After the scarified material has been pulverized and treated with additives, if specified, it shall be spread uniformly to the required cross section and compacted in accordance with of 402.13 or as directed. Shoulders, if so specified or shown on the typical section, shall be constructed in accordance with the applicable requirements of 208.02.

Ditches, if shown on the plans, shall be constructed in accordance with applicable requirements of 208.03. The excavated material shall be used in construction on the road or wasted as directed.

305.04 Blank.

305.05 Patching Asphalt Pavement. Areas to be patched will be marked on the surface by the Engineer and all or part of the existing pavement shall be removed to the depth shown on the typical section or as directed. If it is determined that all of the existing pavement is to be removed, the patching depth shall be the greater of 225 mm (9 in.) or to the bottom of the existing asphalt material. At least a 50 mm (2 in.) vertical butt joint shall be constructed to connect the patch to the pavement that remains in place.

Existing shoulders shall be patched at the locations and to the depth shown on the plans or as otherwise directed.

Subgrade under patches shall be compacted. If the excavation for patches discloses unsuitable material at subgrade elevation, such material shall be removed. The removed area shall be backfilled with suitable material and compacted to the required elevation. An approved template shall be furnished for checking subgrade elevations in trenches. Unauthorized excavation beyond neat lines shall be replaced with suitable material and compacted. Excavation for patching will not be paid for separately but shall be included in the cost of the filling material.

The mixture shall be as set out in the Schedule of Pay Items and made in accordance with these specifications for the kind of mixture used. If the mixture is not specified, the mixture shall be in accordance with 402 for HMA Base 25.0 mm or HMA Intermediate 19.0 mm. Mixture adjustments in accordance with 904.02(a) will not apply. Each course shall be compacted by approved mechanical equipment such as rollers, rammers, or other acceptable means. In small inaccessible areas, hand tamping will be permitted. Rammers shall be capable of exerting a minimum compacting force equivalent to that exerted by the drive wheels of an approved three wheel roller.

A three wheel roller or a pneumatic tire roller in accordance with 408.03(d) shall be used for the final compaction of the top course. Choke aggregate size No. 23, No. 24, or No. 12 may be required on the surface of the patch to eliminate pickup.

A smooth riding surface shall be maintained on HMA patches at all times. Deformations due to traffic or other conditions shall be corrected immediately. HMA base, intermediate, or surface mixtures may be used to maintain patches. HMA mixture used for this purpose will be paid for at the contract unit price per megagram (ton) for HMA for patching. If possible, patches shall be completed during daylight hours and opened to traffic at the close of the work day. Patches that cannot be completed during the day shall be backfilled, compacted, and a temporary surface shall be placed to carry traffic during the night.

305.06 Patching Rigid Pavement or Rigid Base. Areas to be patched will be marked on the surface. Unless otherwise directed or specified, the depth of the concrete shall be 200 mm (8 in.). The surface of the concrete patch shall be at the top of the existing concrete base or concrete pavement. The existing pavement shall be removed completely from the areas to be patched. In general, all sides of a patch shall be straight. The maximum deviation from a straight line on any side shall not exceed 150 mm (6 in.). The sides of a patch shall deviate no more than 30 degrees from a right angle with the centerline. The edges shall be such that the maximum variation from the vertical shall not exceed 40 mm (1 1/2 in.). In trimming and straightening these edges it may be necessary to use hand methods. Methods and equipment used in cutting, breaking, and removal shall not cause undue breakage, excessive shattering, or spalling of the concrete to be left in place and shall be such that will prevent excessive vibration and shock from being transmitted along reinforcing steel to the adjacent pavement.

Areas to be patched shall be outlined with full depth drilled holes spaced no more than 150 mm (6 in.) apart and sawed to the bottom of the steel mesh with a minimum depth of 50

mm (2 in.), or they may be sawed full depth. Where the existing rigid pavement to be patched is overlaid by an asphalt material or the existing rigid pavement is to receive a HMA overlay, the sawing operations previously specified will not be required. Breakage shall be confined to required lines. If there are marginal bars in place where a patch is to extend to an edge, the pavement shall be notched near the edge of the area to be removed and the bars cut prior to further removal operations. If the removed area is to be patched with portland cement concrete, that portion of the pavement which, due to operations, is broken back of the designated lines shall be replaced. This shall be done with no additional payment. Pavement removal for patches will not be paid for directly, the cost thereof to be included in the pay item for the material used.

The subgrade on which the patching material is to be placed shall be compacted thoroughly prior to placing the patching material.

(a) Patching with Portland Cement Concrete. Forms shall be set for the outside edges of the existing pavement. Forms and setting shall be in accordance with the applicable provisions of 501.06. Wood forms no less than 50 mm (2 in.) nominal thickness may be used. If a patch extends from one traffic lane into an adjacent one, forms shall be placed with the face at the line separating the lanes and the new concrete on the face side placed and finished. After the newly poured side is opened to traffic, the forms and any remainder of the old pavement shall be removed and the remaining portion of the patch shall be placed and finished. Although a butt joint is formed, no load transfer steel will be required.

Concrete used for concrete patches shall be in accordance with 501.03.

Reinforced concrete patches shall be in accordance with applicable requirements for plain concrete patches, except the patch shall contain welded steel wire fabric in accordance with the plans. Contraction joints, if required, shall be in accordance with the plans. Materials and construction requirements shall be in accordance with the applicable requirements of 500.

(b) Patching with HMA Mixture. If a rigid pavement or base is to be patched with HMA mixture, the rigid pavement, including overlay, shall be removed in accordance with 305.06, except the size of the patch shall be full lane width and of sufficient length to accommodate the compaction equipment. The depth shall be as shown on the plans. If it is determined that the rigid pavement, including any overlays, requires removal, the patching depth shall be either 300 mm (12 in.) or to the bottom of the existing rigid pavement, whichever is greater. Pavement edges shall be given a tack coat as directed. Compaction shall be in accordance with 305.05.

If only the flexible portion of a composite pavement requires patching, the patching shall be in accordance with the applicable requirements of 305.05.

The mixture shall be as set out in the proposal and made under the provisions of these specifications for the kind of mixture used. If the mixture is not specified, the material shall be in accordance with 402 for HMA Base 25.0 mm or HMA Intermediate 19.0 mm. Mixture adjustments in accordance with 904.02(a) will not apply. Surface tolerances shall be in accordance with 402.16.

305.07 Blank.

305.08 Sealing Cracks and Joints in Asphalt Pavement. Reflection cracks and joints, both longitudinal and transverse, as well as cracked, and alligatored areas shall be sealed using from 0.5 to 0.7 L/m^2 (0.10 to 0.15 gal. per sq yd) of AE-90 or AE-150 asphalt material and covered with either No. 23 or No. 24 sand. The cracks, joints, and alligatored areas shall be cleaned by blowing with compressed air or by other suitable means prior to the placing of the asphalt sealing material. The asphalt material shall be allowed to penetrate the cracks and joints in the existing surface. All surplus shall be squeegeed back and forth over the area to refill them. All excess material shall be squeegeed off the pavement. The sealed surface shall be covered with sand at the rate of approximately 2.7 kg/m^2 (5 lb per sq yd).

305.09 Filling Cracks and Joints in Concrete Pavement. Locations for filling cracks and joints in concrete pavement will be as directed. The cracks and joints shall be cleaned of any loose asphalt pavement or foreign materials and then filled to the level of the existing surface. Any surplus asphalt material shall be removed from the pavement surface. The filler may be RS-2, AE-60, AE-90, or AE-150 in accordance with 902.01(b). If undersealing is required, the material used for filling cracks and joints may be the same material used in undersealing. The pouring temperatures shall be those as required for the respective materials.

305.10 Widening. If the existing base or pavement is to be widened, the lines and grade of the widening shall be as shown on the plans or as specified. The outside face of the excavated area shall be left as nearly vertical as the nature of the material will permit and no wider than the outside limits of the widening section when forms are not used. The subgrade in the widened area shall be compacted prior to the placing of the widening material. The material used to fill the widened section shall be HMA, portland cement concrete, compacted aggregate base, or the combination as specified. It shall be in accordance with the applicable requirements set out in the specifications for the kind and type of material specified.

(a) Widening with HMA Mixture. The widened section shall be filled with HMA mixture of the specified kind laid in courses as shown on the typical section or as directed. The depth of one course shall not exceed 3 times the size of the coarse aggregate used in the mixture.

The mixture shall be in conformance with 402 for HMA base or intermediate mixtures. It shall be placed as directed. Subsequent courses shall not be placed until the existing course has cooled or cured sufficiently so as not to distort, creep, or roll under the rollers. Each lift shall be compacted with approved trench rollers and other approved compacting equipment. The top course shall be compacted with a three wheel roller and a pneumatic tire roller in accordance with 408.03(d).

(b) Widening with Cement Concrete. If the existing rigid base is to be widened with portland cement concrete, the concrete shall be placed directly against the existing pavement edges, which shall be free from all foreign materials. Unless otherwise provided, the widening shall be 200 mm (8 in.) in depth. The surface of the concrete widening shall be at the same elevation as the top of the existing concrete base or concrete pavement. The edges of the widening adjacent to the existing pavement shall be edged to a 19 mm (3/4 in.) radius. If forms are set for the outside edge, it shall be edged in the same manner. All joints between edges of

the adjacent pavement shall be filled with an approved joint filler or sealer. Reinforcing steel will not be required unless so specified. The concrete for widening may be placed with or without forms.

Materials and construction requirements shall be in accordance with the applicable requirements of 501.

If the surface texture is to be a drag finish, a drag shall be used which shall consist of a seamless strip of damp burlap or cotton fabric. It shall produce a uniform surface of gritty texture after being dragged longitudinally along the full width of pavement. For pavement of 4.8 m (16 ft) or more in width, the drag shall be mounted on a bridge which travels on the forms. The dimensions of the drag shall be such that a strip of burlap or fabric at least 0.9 m (3 ft) wide is in contact with the full width of pavement surface while the drag is used. The drag shall consist of no less than 2 layers of burlap with the bottom layer approximately 150 mm (6 in.) wider than the upper layer. The drag shall be maintained in such condition that the resultant surface is of uniform appearance and reasonably free from grooves over 2 mm (1/16 in.) in depth. Drags shall be maintained clean and free from encrusted mortar. Drags that cannot be cleaned shall be discarded and new drags substituted.

Smoothness shall be in accordance with the applicable requirements of 501.16 from a line 0.9 mm (3 ft) out from the edge of the existing pavement being widened to the outside edge of the new widening. The new concrete adjacent to the existing pavement shall be at the same elevation as the old pavement.

Curing shall be in accordance with the applicable requirements of 501.17. If resurfacing is a part of the contract, the surface of the newly placed concrete shall be finally finished by dragging with wet burlap or cotton fabric or by the use of a wooden float. In lieu of curing with earth, asphalt emulsion, AE-T may be used as curing material. No traffic shall be permitted on this application until the concrete has attained its required curing, which shall be no less than 48 hours.

(c) Widening with Compacted Aggregate. All or a portion of the widened area shown on the plans or as specified, shall be filled with compacted aggregate of the type shown and placed in accordance with the specifications for the material used. The lifts shall be as shown or directed. Each course shall be compacted using the equipment in accordance with 305.10(a). The pneumatic tire roller shall be used on the top lift if the course is at pavement grade.

305.11 Method of Measurement. Reconditioning will be measured as indicated below. Such measurements will include all blading of ditches and shoulders if required, the milling and pulverizing of the existing roadbed, the preparation and conservation of existing bituminous materials, excavation, the compacting of the roadbed, the finishing of the surface, and the maintenance of the complete surface if applicable.

Water will be measured by the kiloliter (1,000 gallons), by means of calibrated tanks or distributors, or by means of accurate water meters. Only that water which is used in mixing materials or ordered to keep the surface moist will be measured for payment.

Repairing will be measured by the kilometer (mile). Patching asphalt pavement will be measured by the megagram (ton) of HMA mixture used. Patching rigid pavement or base will be measured by the square meter (square yard), if cement concrete is used, or by the megagram (ton), if HMA mixture is used.

Sealing cracks and joints in asphalt pavements, filling joints and cracks in concrete pavement or base widening with HMA mixture, compacted aggregate, and HMA for patching will be measured by the megagram (ton) of material used. Cement concrete will be measured by the square meter (square yard) complete in place.

305.12 Basis of Payment. The accepted quantities of reconditioning work will be paid for as set out below for each pay item. Water will be paid for at the contract unit price per kiloliter (1,000 gallons) when specified as a pay item, complete in place.

Payment will be made under:

Pay Item	**Metric Pay Unit Symbol (English Pay Unit Symbol)**
Cement Concrete	m2 (SYS)
Compacted Aggregate for _____, ____, ____ (type, size)	Mg (TON)
Compacted Aggregate for Patching	Mg (TON)
Cracks and Joints in Asphalt Pavement, Seal	Mg (TON)
Cracks and Joints in Concrete Pavement or Base, Fill	Mg (TON)
HMA for Patching	Mg (TON)
HMA for Patching, Temporary	Mg (TON)
Portland Cement Concrete for Patching _____ (Pavement type)	m2 (SYS)
Repairing	km (MILE)
Water for Reconditioning	kL (KGAL)
Widening with _____, _____ mm (Mixture)	Mg (TON)

The costs of furnishing, necessary storage, hauling, and placing of all materials; pavement removal as required; temporary pavement required to carry traffic at night; HMA overlay of a concrete patch in the pavement removal area as required; choke aggregate required to eliminate pickup; disposal; excavation; preparation of subgrade; compacting; finishing; curing; and filling cracks and joints except as otherwise provided shall be included in the costs of the patching materials.

The costs of all materials, covering aggregate, milling and cleaning, and all necessary incidentals shall be included in the cost of sealing cracks and joints in asphalt pavement.

The cost of excavation and disposal of existing materials required for the widening material shall be included in the cost of the widening material.

SECTION 306 -- Blank

SECTION 307 -- PORTLAND CEMENT CONCRETE BASE

307.01 Description. This work shall consist of constructing a course of portland cement concrete base, with or without reinforcement as specified, on a prepared surface in accordance with these specifications and in reasonably close conformance with the established lines, grades, and typical cross sections shown on the plans or as directed.

MATERIALS

307.02 Materials. Materials shall be in accordance with the following:

Air-Entertaining Admixtures	912.03
Asphalt Emulsions	902.01(b)
Coarse Aggregate, Class AP, Size No. 8	904.02
Coarse Aggregate, Class AP	904.02
Curing Materials	912.01
Cutback Asphalts	902.01(c)
Fine Aggregate, No. 23 Sand	904.01
Fly Ash	901.02
Portland Cement	901.01(b)
Reinforcing Steel	910.01
Water	913.01

CONSTRUCTION REQUIREMENTS

307.03 General Requirements. All applicable requirements of 500 will apply except as otherwise provided herein. Regardless of the placing method used, the tolerance for smoothness of the final surface shall be 5 mm (3/16 in.) instead of 3 mm (1/8 in.) in accordance with 501.16.

307.04 Joints. Unless otherwise provided, contraction and expansion joints will not be required. If required, contraction and expansion joints shall extend through the curbing, if any.

Unless the base is poured in traffic lane widths, longitudinal joints shall, except as hereinafter set out, be in accordance with applicable provisions of 501.14(b). If sawed joints are used, sawing shall be done before the base is opened to traffic or within 7 days after the concrete is placed, whichever is earlier.

If the base is constructed in separate lanes, longitudinal joints shall be of the keyway type in accordance with 501.14(b).

307.05 Placing Steel. No steel, other than the necessary bars for joints, will be required unless its use is specifically set out in the contract or ordered. If required, it shall be placed in accordance with 501.13.

307.06 Final Finish. Final finish shall be that produced by dragging the surface before initial set with wet burlap or by the use of approved floats.

307.07 Curing. If the contract provides for a HMA mixture to be placed on the newly constructed base, the base shall be cured with asphalt. As soon as the concrete surface has attained its initial set, it shall be covered with a uniform application of approximately 0.5 L/m^2 (0.10 gal. per sq yd) of AE-T, applied with a hand spray. If asphalt emulsion is used, the demulsibility and stone coating test will be waived. A distributor will not be permitted on the base while applying the material. Traffic shall not be permitted on this application until the concrete has attained its required curing, which shall be no less than 96 hours, or longer if directed. Where asphalt curing is used, any tack coat which otherwise might be required shall be omitted.

If the contract does not provide for a HMA mixture to be placed on the newly constructed base, the curing methods in accordance with 501.17 may be used.

307.08 Monolithic Curb. If monolithic curb is required, the concrete for this curb shall be the same composition as that used in the base. To ensure that the upper portion of the curbing is truly monolithic with the lower portion, the concrete for the upper portion shall be placed within 30 minutes after that for the lower portion. As a further aid in monolithic construction, the surface of the lower portion shall be roughened before the upper portion is placed.

If the placing of concrete for the upper portion is discontinued for more than 30 minutes, a bulkhead perpendicular to the subgrade shall be placed at right angles to the centerline. The curbing shall be finished to the bulkhead.

Curb forms shall be in accordance with 605.04.

The top of the curbing shall be floated smooth with a wooden float and the outer upper edge rounded to the required radius.

Forms shall be removed from the inside faces within 24 hours after the concrete has been placed and any minor defects corrected with a one part portland cement to two parts sand mortar, applied with a wooden float. The curbing shall then be cured by one of the methods in accordance with 501.17.

307.09 Method of Measurement. Portland cement concrete base will be measured by the square meter (square yard) complete in place. The width for measurement will be the width of the pavement shown on the plans and additional widening where called for, or as otherwise directed. The length will be measured along the centerline of each roadway or ramp. Monolithic curb will be measured by the meter (linear foot).

307.10 Basis of Payment. The accepted quantities of portland cement concrete base will be paid for at the contract unit price per square meter (square yard) for portland cement concrete base. Monolithic curb will be paid for at the contract unit price per meter (linear foot) for curb, monolithic.

Payment will be made under:

Pay Item	Metric Pay Unit Symbol (English Pay Unit Symbol)

Curb, Monolithic .....m (LFT)
Portland Cement Concrete Base..... m2 (SYS)

If portland cement concrete base is found to be deficient in thickness, only the reduced price in accordance with 501.24 will be paid.

No additional payment over the contract unit contract price will be made for portland cement concrete base which has an average thickness in excess of that shown on the plans.

The costs of furnishing and placing all materials, including reinforcing steel, dowels, asphalt emulsion or cutback asphalt, and joint material, shall be included in the cost of this work.

SECTION 308 -- Blank

SECTION 309 -- Blank

SECTION 310 -- CEMENT CONCRETE PAVEMENT PATCHING

310.01 Description. This work shall consist of the removal and replacement of unsound cement concrete pavement as shown on the plans, in accordance with these specifications, or as directed.

310.02 Materials. Materials shall be in accordance with the following:

Air Entraining Admixture.....912.03(a)
Calcium Chloride 913.02
Coarse Aggregate, Class AP.....904.02
Dowel Bars .....910.01(b)10
Fine Aggregate.....904.01
Liquid Membrane Forming Curing Compound.....912.01(e)
Portland Cement, Type I.....901.01(b)
Water 913.01
Water Reducing Admixture .....912.03(b)1

Aggregate for partial depth patching shall be coarse aggregate, class A, size No. 11, and fine aggregate, size No. 23. Aggregate for full depth patching shall be coarse aggregate, class A, size No. 8, and fine aggregate, size No. 23. Only stone or gravel coarse aggregate shall be used for patching concrete.

The material for anchoring the dowel bars shall be a chemical anchor system which has been approved by the Department and is shown on the List of Approved or Prequalified Materials.

The non-vapor barrier type bonding agent shall be listed in the Department's List of Approved or Prequalified Materials.

The grout retention disk shall be a rigid nylon or plastic material in accordance with the dimensions shown on the plans.

310.03 Proportioning. The fine aggregate shall be 35 to 45 percent by weight of the total aggregate used. The cement content shall be a minimum of 390 kg/m^3 (658 lb per cu yd) of concrete. The water/cement ratio shall not be greater than 0.40. A water reducing admixture shall be used. The air content shall be 5 to 8 percent and shall be accomplished by the use of an air entraining admixture. The slump shall be 50 to 125 mm (2 to 5 in.).

Calcium chloride solution shall be added to the concrete during mixing and shall be a maximum of 2 percent by weight of cement. This limit shall be reduced to one percent if the ambient temperature is above 27EC (80EF). The concrete shall be placed within 30 minutes after the addition of the calcium chloride solution. If the location of the plant is such that this time limit cannot be met, then the calcium chloride solution shall be added to the concrete at the site and the concrete shall then be mixed for an additional 40 revolutions prior to discharge.

Prior to beginning pavement patching, the Contractor shall submit a concrete mix design in full accordance with the above requirements. The Contractor shall arrange a demonstration of such concrete mix designs to be used either prior to construction in a laboratory type concrete mixer or on the first day of concrete placement at the project site. The Engineer will verify the mix proportioning, test the concrete's air content and water/cement ratio, and cast flexural beams. The flexural beams will be tested to determine if the concrete mix design achieves 2068 kPa (300 lb psi), third point loadings, toward opening to traffic within 24 hours, and that the mix achieves at least 3447 kPa (500 psi), third point loading, within 3 calendar days. The concrete mix design shall be in accordance with all of the above requirements before the mix will be approved.

310.04 Concrete Removal. Removal areas will be marked. Partial depth removal shall be a minimum of 25 mm (1 in.), to a maximum of 75 mm (3 in.). Full depth removal shall be the entire depth of the concrete pavement and shall be performed in whole multiples of full lane widths unless otherwise directed.

The concrete pavement shall be saw cut around the perimeter of the marked areas. Transverse cuts shall be perpendicular to the centerline of the pavement. All unsound concrete within the saw cut area shall be removed by handchipping unless otherwise specified. Handchipping tools may be hand or mechanically driven. Jackhammers used for partial depth removal shall not be heavier than nominal 21 kg (45 lb) class. Chipping hammers shall be used for partial depth removal under reinforcing steel. Chipping hammers shall not be heavier than nominal 7 kg (15 lb) class. Mechanically driven tools shall be operated at a maximum angle of 45 degrees from the pavement surface.

(a) Partial Depth Removal. Wire mesh reinforcement, encountered during partial depth removal operation shall be removed from within the perimeter of the removal area. Reinforcing steel encountered during the partial depth removal operation shall not be damaged. If exposed reinforcing steel is damaged by the removal operation it shall be repaired or replaced, as directed, with no additional payment. Where the bond between the existing concrete and reinforcing steel has been destroyed, the concrete adjacent to the steel shall be

removed to a minimum clearance of 25 mm (1 in.) around the entire periphery of the exposed steel.

A minimum 25 mm (1 in.) vertical surface shall remain, or be cut, 25 mm (1 in.) outside and around the entire periphery of the cavity, after the removal of all loose and unsound concrete.

If unsound concrete is still encountered at the 75 mm (3 in,) depth, the cavity shall be made full depth.

If an existing crack or joint is located within the removal area, then the limits of removal shall be enlarged as necessary to ensure that the removal extends at least 0.3 m (1 ft) beyond the joint and/or crack.

(b) Full Depth Removal. Areas designated for full depth removal shall be saw cut through the full pavement thickness prior to beginning the removal operation. The minimum size of the removal area shall be as shown on the plans for a full depth patch. The minimum longitudinal clear distance between successive full depth removal areas shall be 3.0 m (10 ft). Successive removal areas in the same lane which are closer than the 3.0 m (10 ft) minimum shall require continuous removal between the longitudinal extremes of the successive removal areas. If an existing transverse joint is located within the removal area, then the limits of removal shall be enlarged as necessary to ensure that the removal extends at least 0.3 m (1 ft) beyond the joint.

Vehicle mounted removal equipment may be used to remove the concrete pavement after the full depth saw cut is completed, provided this equipment does not damage the adjacent sound concrete.

Excavation of the subbase shall be within the limits as shown on the plans unless otherwise directed. All subgrade material disturbed during the removal operation shall be recompacted as directed.

310.05 Cleaning. After the completion of the concrete removal operation and just prior to placing the new concrete, the partial depth cavities shall be thoroughly sandblasted. Exposed reinforcing steel, which is to remain in place, as well as the concrete under and around the exposed reinforcing steel shall also be thoroughly sandblasted.

The exposed surfaces of the cavity and the reinforcing steel shall then be cleaned free of all dust, chips, and water. The prepared surfaces shall be free of oil and grease. The air lines for sandblasting and air cleaning shall be equipped with oil traps.

310.06 Patching. Placement of the patching concrete between May 15 and September 15 shall be done only after 1:00 P.M. Placement of the patching concrete during other calendar time periods may be done at any time if the ambient temperature is not to exceed 21EC (70EF), unless otherwise directed.

Prior to placing the patching concrete, the cleaned partial depth cavity surfaces and exposed reinforcing steel shall be coated with a non-vapor barrier type bonding agent with an

extended contact time for bonding. The bonding agent shall be applied to the cleaned vertical and horizontal surfaces in accordance with the manufacturer's recommendations. The patching concrete shall be placed prior to the contact time restriction for the bonding agent. Coated surfaces shall be protected as necessary from detrimental effects of contaminants such as dust and dirt. Contaminated surfaces shall be recleaned as recommended by the manufacturer. The bonding agent shall then be reapplied.

The patching concrete shall be placed to the level of the adjacent pavement and shall be consolidated by internal vibration at the time of placement. The patch shall be hand finished in accordance with the applicable requirements of 501.15. Only float finishing shall be required if the pavement is to be resurfaced after patching.

No cavities shall remain unpatched overnight. All shoulder areas and adjacent pavement damaged during the concrete removal and/or concrete patching operation shall be repaired as directed, with no additional payment.

Liquid membrane forming curing compound shall be applied to the finished surface of the concrete patch. A sheet of polyethylene film shall then be placed over the patched area and covered with a 100 mm (4 in.) layer of rigid or flexible insulation. The insulation/film blanket shall be firmly anchored. Small dimension lumber weighted with sandbags may be used, but no large objects such as rocks or concrete blocks will be permitted.

A patch may be opened to traffic in accordance with the following table only when the patch has been constructed and cured in accordance with the requirements as set out herein.

T	H	HT	T	H	HT
4 - 5EC (40 - 42EF)	30	26	16 - 17EC (61 - 63EF)	14	9
6 - 7EC (43 - 45EF)	27	23	18 - 19EC (64 - 66EF)	14	9
8 - 9EC (46 - 48EF)	24	21	20 - 21EC (67 - 69EF)	14	8
10 - 11EC (49 - 52EF)	21	19	22EC (70 - 72EF)	14	7
12EC (52 - 54EF)	19	16	23 - 24EC (73 - 75EF)	14	6
13 - 15EC (55 - 60EF)	16	14	24EC (Above 75EF)	14	5
58 - 60	16	11			

T = Minimum ambient temperature during placement, or patching concrete temperature at time of delivery, which ever is lower.

H = Minimum hours to open to traffic.

HT = Minimum hours to opening patch with 100 mm (4 in.) insulation to traffic when truck traffic is 10 percent or less of current average daily traffic.

A patch may be opened to traffic sooner than permitted by the above table if test beams indicate a modulus of rupture of at least 2070 kPa (300 psi), third point loading.

(a) Partial Depth Patching. The plans of existing cracks within the limits of the cavity shall be maintained throughout the depth of the patch by the use of appropriate thicknesses of preformed joint material or roofing felt. After the patch has cured, sawing and sealing of these cracks may be required as directed. Existing pavement joints within the cavity shall be maintained or reconstructed, as directed, throughout the depth of the patch. After the patch has cured, these joints shall be sawed and sealed as directed.

(b) Full Depth Patching. Full depth patching shall be performed in whole multiples of full lane widths. The full depth patch shall be anchored to the adjacent pavement with dowel bars as shown on the plans. If the adjacent pavement is deteriorated to the extent that the dowel bars cannot be firmly anchored, then the full depth removal shall be continued until sound concrete is encountered. If the deficiency of the adjacent pavement is due to damage from the removal operation, the additional removal and patching shall be performed with no additional payment.

The dimensions, spacing, and depth of anchoring of the dowel bars shall be as shown on the plans. The dowel holes shall be blown clean and allowed to dry after drilling. The dowel bars shall be installed with a slight twisting motion such that the entire void between the hole and the dowel bar shall be filled with anchoring material from the back of the hole outward. Immediately following the placement of each dowel, the grout retention disk shall be installed as shown on the plans. The proper dowel bar alignment shall be maintained until the anchoring material hardens. Existing joints which are within the limits of a full depth patch shall be reconstructed as specified or directed.

If the pavement is to be overlaid as part of the contract or there is an existing overlay which is to be replaced as part of the contract, then the transverse joint between the full depth patch and the adjacent pavement shall not be sawed nor sealed as shown on the plans. Otherwise this joint shall be sawed or formed, and sealed as shown on the plans.

310.07 Method of Measurement. Partial depth patching and full depth patching will be measured by the square meter (square yard). The concrete removal, subbase excavation, epoxy resin adhesive, dowel bars, grout retention disks, anchoring material, patching concrete, finishing and curing, and the sawing and sealing of cracks and joints will not be measured for payment.

310.08 Basis of Payment. Cement concrete pavement patching will be paid for at the contract unit price per square meter (square yard) for the type of patching required in the type of pavement patched.

Partial depth patches which have been directed to be made full depth will be paid for at the contract unit price per square meter (square yard) for patching, partial depth, in the type of pavement patched. Additional payment for such patching will be made at 80 percent of the contract unit price per square meter (square yard) for patching, full depth, in the type of pavement patched.

Payment will be made under:

Pay Item	Metric Pay Unit Symbol (English Pay Unit Symbol)
Patching, Full Depth, Continuously Reinforced Concrete Pavement	m2 (SYS)
Patching, Full Depth, Plain Concrete Pavement	m2 (SYS)
Patching, Full Depth, Reinforced Concrete Pavement	m2 (SYS)
Patching, Partial Depth, Continuously Reinforced Concrete Pavement	m2 (SYS)
Patching, Partial Depth, Plain Concrete Pavement	m2 (SYS)
Patching, Partial Depth, Reinforced Concrete Pavement	m2 (SYS)

The costs of concrete removal, patching, and all necessary incidentals shall be included in the cost of cement concrete pavement patching.

SECTION 300 -- BASES

SECTION 301 -- Blank

SECTION 302 -- Blank

SECTION 303 -- COMPACTED AGGREGATE BASE, SURFACE, OR SHOULDERS

SECTION 304 -- SUBBASE